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in understanding this option. Help is not available in the program.

Vortex Induced Vibration

This calculation is the response of cylindrical structures to periodic vortex shedding. The program includes natural frequency calculations for beams, strings, and cables and determines the resonance response and drag magnification. This option has four separate menu options including the vortex menu, fluid menu, natural frequency menu, and the calculation menu. The program does contain correlations for tube metal properties and physical properties for a few single components. All values can be entered if desired. The program calculated the flow vortex shedding frequency and amplitude for modes 1 through 3. The calculations are for uniform velocity along the element.

Flutter Analysis

The flutter analysis determines the onset of divergence and flutter of vanes and airfoils. The program provides guidelines for minimum stiffness to prevent flutter.

Sonic Fatigue of a Flat or Curved Plate

The response of flat and curved panels to sound and turbulence pressures imposed on their surface are calculated. The program includes calculation of panel natural frequency and maximum stress and displacement of response. The program can be used to determine the minimum skin gauge to prevent sonic fatigue. Calculations are completed for the first three modes.

Heat Exchanger Vibration Analysis

The program calculates tube vibration and acoustic resonance in shell-and-tube heat exchangers and rectangular ducts. The program includes calculations of the tube natural frequency, U-tube analysis, and onset of tube instability. The program can be used to size the location and number of supports to prevent tube instability and to determine the number of baffles required to prevent acoustic resonance.

The program is somewhat limited, in that it does not consider the inlet or outlet regions of the exchanger directly. It also considers the physical properties of the fluids and velocities as constants. It further does not allow for baffle spacing that is not the same throughout the exchanger.

Acoustic resonance calculations are carried out for the first three modes. Critical velocities are calculated for a range of intermediate supports, and comments made on the stability of the exchanger.

Calculations are carried out for clamped-clamped boundary conditions, clamped-pinned boundary conditions, and pinned-pinned boundary conditions.

By making successive runs of the program changing parameters, it is possible to get around the limitations mentioned above.

Closed form solutions are used for the tube and acoustic natural frequencies and scaled data are used for instability criteria.

Interfacing

The program does not contain provisions for interfacing to other programs. However, the program does permit printing to printer and does not block printing with the PrtSc key.

Machine Requirements

The program requirements are modest. The program will operate on any PC running DOS. Memory requirements are minimum, at 230 k-bytes. One of the modules in the program does provide low resolution graphics, but a graphics display is not required for program operation.

Summary

The set of programs will give the experienced engineer additional tools to use in analysis of flow-induced vibration programs. In addition to handling heat exchangers, the methods in the program can be used to analyze towers, stacks, cables, and aircraft skin panels.

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